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Indian Slough

Summary of 2015 Surface Water Monitoring Program Results

Washington State Department of Agriculture

Natural Resources Assessment Section

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Introduction

The Washington State Department of Agriculture has monitored pesticide concentrations in surface water throughout Washington since 2003. WSDA takes water samples during the typical pesticide use season (March through September). In 2015, 14 sites were monitored in Washington, four sites in Skagit County. State and federal agencies use this data to evaluate water quality and make exposure assessments for pesticides registered for use in Washington State.

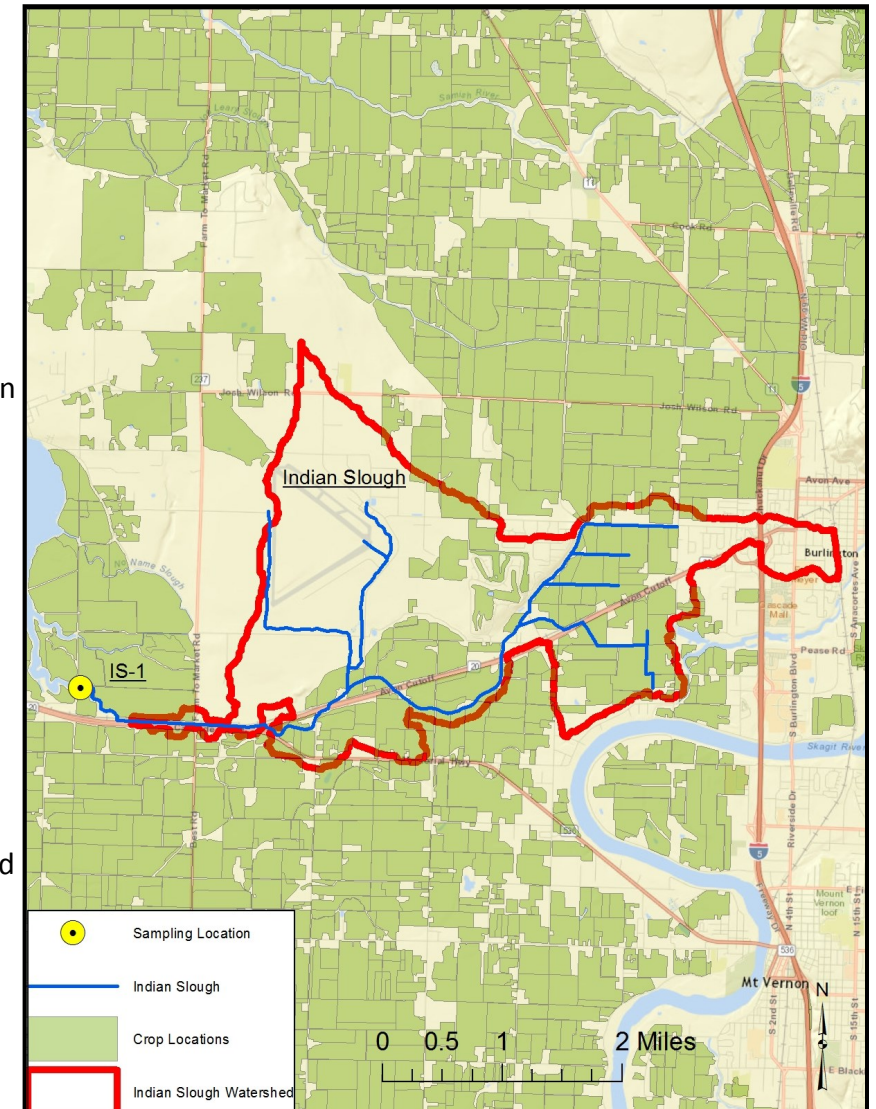
Study Area

WSDA has sampled water from Indian Slough from 2006 through 2015. The watershed drains about 2,600 acres of farmland, and land use is agricultural and commercial. The main crops are potatoes, grass hay, blueberries, pasture and field corn. Indian Slough provides habitat for chinook and coho salmon*. The Skagit Valley (and the Browns Slough watershed) is also a crucial area for migratory waterfowl, including trumpeter swans, tundra swans, snow geese, and other birds.

* Washington State Department of Fish and Wildlife

Sampling Details

- Samples were collected for 20 weeks, from March 9 through August 20.
- Water samples were tested for 206 chemicals: current and legacy insecticides, herbicides, fungicides, rodenticides, wood preservatives, and pesticide degradates.
- Sample analysis for pesticides and total suspended solids was conducted at Manchester Environmental Laboratory in Port Orchard, WA.
- General water quality parameters; dissolved oxygen, conductivity, pH, water temperature, and streamflow were measured at every sampling event.
- Air and water temperature (measured every 30 minutes) was monitored for the entire sampling season.
- Sampling stopped 5 weeks early because of low streamflow (hot summer temperatures and drought conditions).



This table shows the pesticides detected, with dates and concentrations. They are color coded to identify which assessment criteria were surpassed. The assessment criteria used here are state and federal water quality criteria, reduced by half for safety. This 0.5 safety factor is used to make sure the criteria protect aquatic life and water quality issues are found early. Watersheds with detections above the criteria are prioritized for more monitoring and educational outreach. See <http://agr.wa.gov/PestFert/natresources/SWM> for more information.

Assessment Criteria		Month and Day		Mar			Apr					May				Jun					Jul		
		Analyte Name †	Use‡	9	18	23	1	6	15	20	29	4	11	18	27	2	8	16	22	30	6	15	20
May affect fish survival at sensitive life stages		2,4-D	H						0.08		0.068								0.13				
		AMPA	H	--	--	--	--	--	0.079	0.048	0.067	0.068	0.063	--	--	--	--	--	--	--	--	--	--
		Azoxystrobin	F			0.027		0.109	0.012	0.021	0.014	0.029		0.01				*				0.005	
Additional level of protection for endangered species		Captan	F					0.2													0.6		
		Chlorpropham	H					0.21		0.061	0.067	0.13											
		Cyprodinil	F													0.23	*	0.033	0.01				
May affect invertebrate survival		Dacthal (DCPA)	H																		0.056	0.054	
		Dicamba	H																0.031				
		Dichlobenil	H	0.006	0.012	0.018	0.017	0.014	0.027	0.014	0.016			0.013									
Nearing a pesticide state water quality standard		Difenoconazole	F		0.007		0.029	0.035	0.02			0.02						*					
		Diphenamid	H	0.026				0.034				0.032											
		Diuron	H		0.014	0.011	0.013	0.01	0.009	0.007	0.01	0.008			0.006	0.008		0.009	0.008	0.008		0.009	0.012
May affect fish growth or reproduction with prolonged exposure		Fludioxonil	F					0.076								0.11	0.11						
		Glyphosate	H	--	--	--	--	--	0.22	0.082	0.11	0.11	0.11	--	--	--	--	--	--	--	--	--	--
		Imazapyr	H	0.021	0.022	0.025	0.034		0.024	0.016	0.07	0.021	0.008				*						
May affect invertebrate growth or reproduction with prolonged exposure		Isoxaben	H										0.004				*						
		MCPA	H										0.044		0.039					0.036			
		Mecoprop (MCPP)	H																0.041				
May affect aquatic plant growth		Metolachlor	H	0.033	0.057	0.05	0.037				0.033	0.036	0.03	0.032	0.082								
		Monoecrotophos	I-OP	0.2																			
		Monuron	H					0.003	0.003	0.002		0.002					*						
May affect aquatic plant growth or reproduction with prolonged exposure		Pentachlorophenol	WP		0.022		0.023																
		Propiconazole	F	0.007	0.018	0.018	0.028	0.018	0.022	0.013	0.032	0.019	0.018	0.014			*						0.033
		Sodium bentazon	H														0.092						
Below all identified criteria		Sulfometuron methyl	H								0.045						*						
		Tebuthiuron	H	0.094	0.058																		
		Tetrahydrophthalimide	D-F			0.13										1.2							
No published criteria available		Thiamethoxam	I-N		0.02	0.018	0.014	0.01									*						
		Triclopyr acid	H		0.031		0.038		0.073		0.071												
		Temperature	N/A	51.57	51.24	50.14	53.49	53.19	51.53	59.65	54.99	60.04	61.07	65.32	--	62.83	74.12	68.85	72.16	73.29	75.36	71.19	78.94
Not detected (below detection limit)		Dissolved oxygen	N/A	3.46	6.24	6.63	7.15	5.42	7.32	6.27	7.6	7.51	8.13	7.91	8.75	8.66	9.67	6.08	10.75	7.2	9.82	11.73	5.21
		Percipitation	N/A	0	0	0	0	0	0	0	0	0.08	0	0	0	0.2	0	0	0	0	0	0	0
		Streamflow	N/A	22.03	--	42.88	--	27.38	11.49	38.65	36.32	17.36	20.69	16.27	12.5	10.26	11.98	11.6	13.97	8.046	--	--	--
No Data	--	Total suspended solids	N/A	18	20	8	8.5	9	26	8	6	7	14	6	4	5	21	7	8	8	13	27	61
		‡ D: Degradate, F: Fungicide, H: Herbicide, I: Insecticide, N/A: Not applicable, N: Neonicotinoid, OP: Organophosphate, WP: Wood preservative, *Equipment malfunction. †Units are as follows: pesticides, µg/L; temperature, °F; dissolved oxygen mg/L; percipitation, week total inches; streamflow, cfs; and total suspended solids, mg/L. Bold: Indicates a temperature or dissolved oxygen value above state water quality standards.																					

Results Summary

- There were 124 total pesticide detections in Indian Slough, none were at levels above the assessment criteria.
- Diuron and propiconazole were the most frequently detected compounds. Both are used in many different products.
- Common products containing diuron are Karmex, Direx and Diuron.
- Common products containing propiconazole are Propimax, Quilt, Stratego and Tilt.
- Diuron is a pesticide of concern in Washington State. It has been detected in past years in Skagit County above the assessment criteria.

Recommendations

- Read and follow label directions to protect water quality.
- Eliminate drift and runoff to adjacent surface water.
- Implement best management practices, including conservation buffers, vegetative filter strips, sediment basins, and setbacks from water.
- Review pest control needs and select appropriate and less-toxic pesticides when possible.
- Manage irrigation to prevent runoff, and check the weather forecast before application to prevent runoff due to rainfall.
- Maintain, inspect, and calibrate application equipment.